Total Ship Process Modeling

"Ship Design Project Management; can we improve?"

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Prescribed by ANSI Std Z39-18

Some questions:

- Have you ever been involved in a project that was completed late?
- Have you ever been delayed by someone else not providing you the input you needed?
- Has anyone expected you to provide something without letting you know?
- Have you ever had a beneficial suggestion, but no means of demonstrating its value?
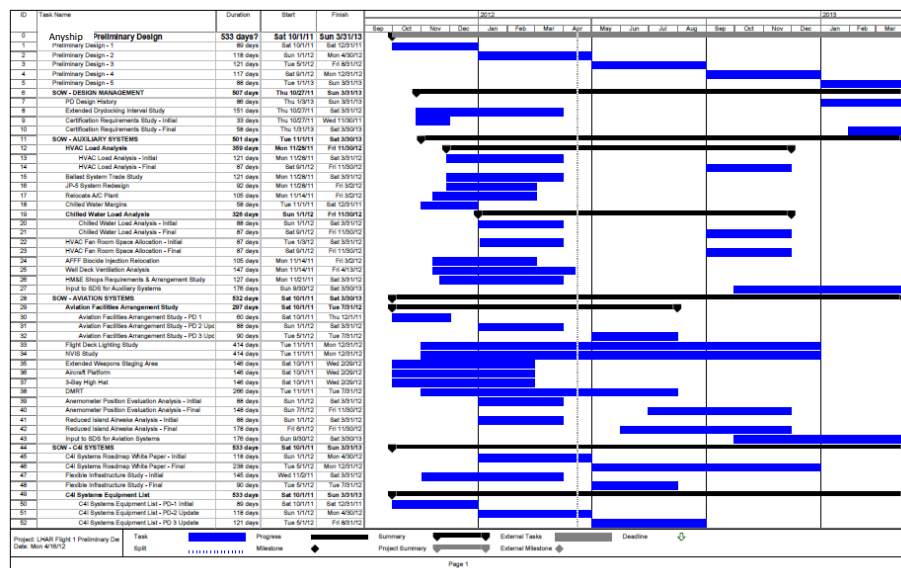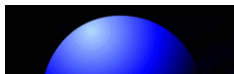
YOU WANT IT WHEN ?!

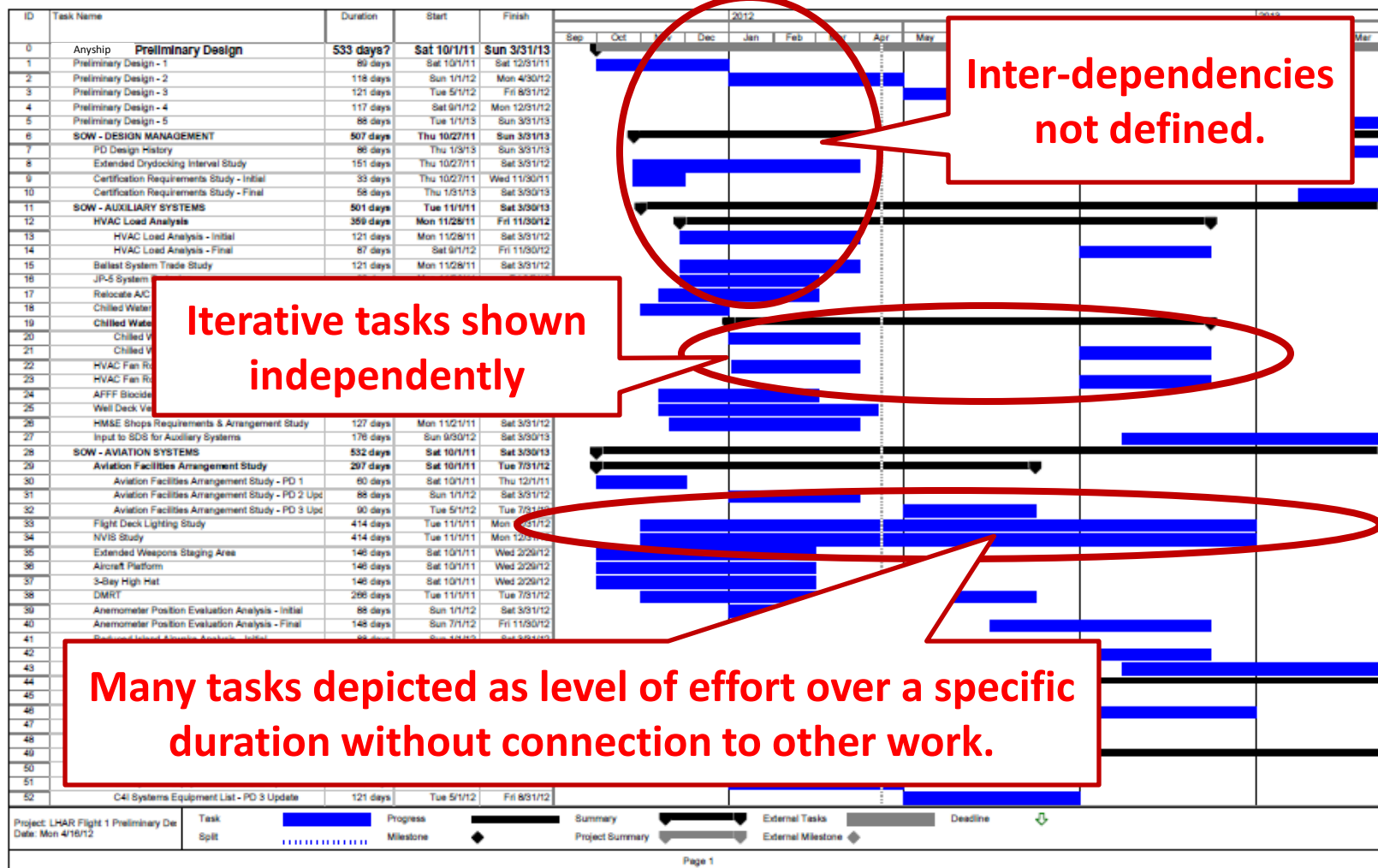**Notice:**
Bad planning on your part does not constitute an emergency on my part.
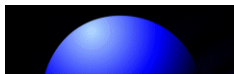
Typical Preliminary Design Schedule

- Tasks described in Microsoft Project®

- Collocated HM&E resources (to extent possible)

- Multiple Commands involved

  – Aviation Systems

  – Combat Systems

  – Integrated Warfare Systems

Level of Effort vs. Detailed Process

Dynamic Management

- Requirements and Program Office direction can change.

- Weekly stand-up meetings provide this week's priorities and "30 day look" (cadence.)

- The on-site team is cohesive; remote team elements may be less well integrated.

- Design Reviews are key to integration; solutions to issues examined in next cycle.

- Success is function of Ship Design Manager (SDM) skill and intuition.
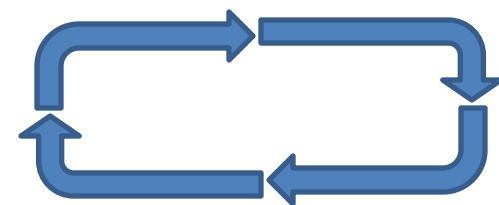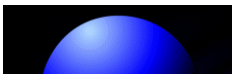
Organizational Wisdom

- Schedules are based on the experience of the community and leadership expertise.

- Past practice is captured in "Red Books" and Annual Reports.

- Technical Warrant Holder community provides domain expertise.

- Emphasis is on budget allocation.
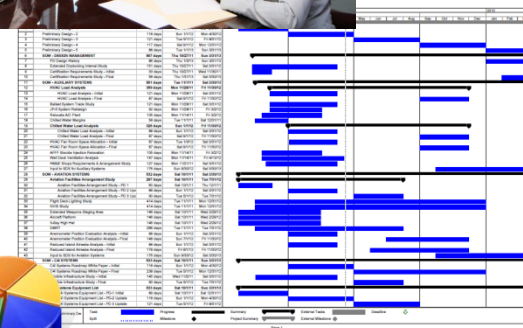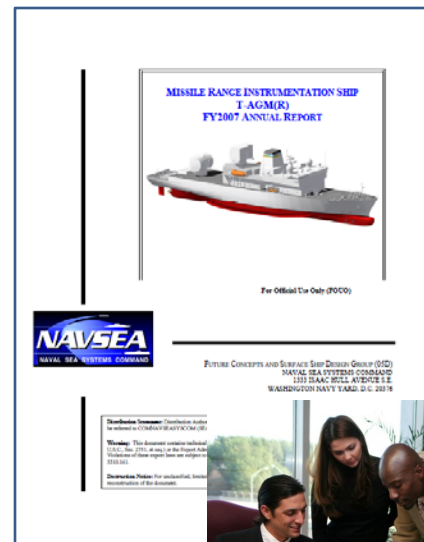
Opportunity

- Navy budgets increasingly constrained.

- Ship design community decimated.

- Systems becoming more complex.

- Engineering and planning processes consume approximately one third of life cycle costs. (~$13B/yr)

- Scheduling with time-trusted techniques can cause:
    - Unnecessary work
    - Delays
    - Engineering errors; missing data

Can we do better?
Yes, we can!
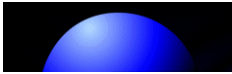
The Ship Design Process Model

- Since 2008 the Navy has been developing a model of the ship design process.

- Initial objective was to quantify the benefits of new software.

- The team has identified some new tools and techniques that help us capture the expertise of the community and apply it towards effective project planning.

- The Technical Warrant Holder Community has contributed its expertise.

- We are in the pilot stage on real acquisition programs to validate anticipated benefits.
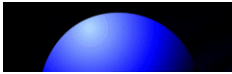
Data-Centric Approach

- The Ship Design Process Model (SDPM) is a database that captures the activities and transactions within the ship design process.

- The Ship Design Process Reference Model (SDPRM) represents a typical surface combatant design process.

- The SDPRM data was gathered primarily during the ONR Ship Design Workshops.

- The SDPRM is a starting point for planning other ship design processes; unique models generated.

- The SDPRM includes a representative range of activities and reminds the SDM of activities to consider when planning a new project, of any type.

- Commercial software enables rapid editing to tailor the process and supports simulations to explore alternatives.

The SDPRM has been modeled using the PLEXUS® software from Plexus Planning, Ltd. This commercial product has proven to be intuitive and capable of meeting our modeling needs. Used by Rolls Royce, GE, Boeing, & Raytheon.

Multiple Views of Same Data

Process Diagrams "Boxes and Arrows"
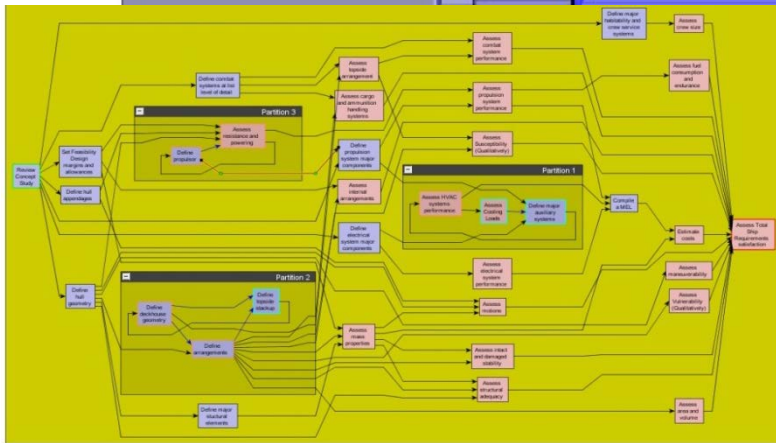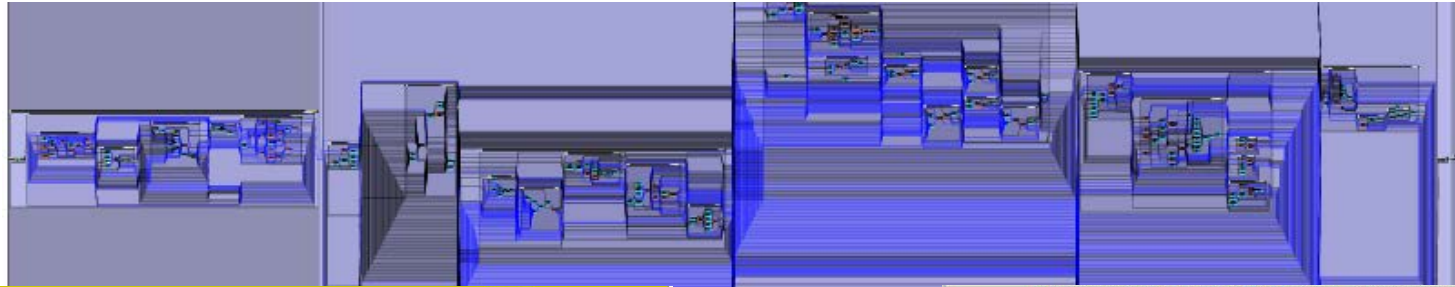
Alternate WBS Views

Spreadsheets

Design Structure Matrix

Gantt Chart
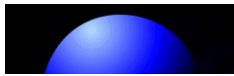
Process Data

- The SDPM captures data on activities and their interdependence.

- The SDPM clearly defines inter-organizational relationships and responsibilities.

- Activity data can include the typical content of tasking statements such as:
  - Organizational Assignments
  - Expected Deliverables
  - Resources Required
  - Expected Duration
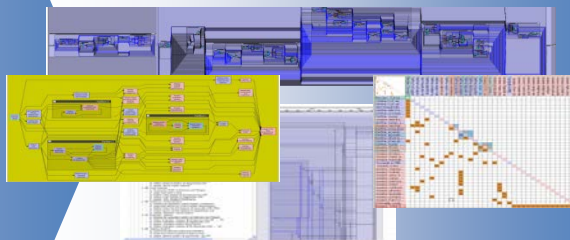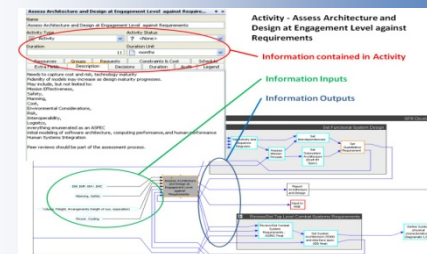 - User-defined data

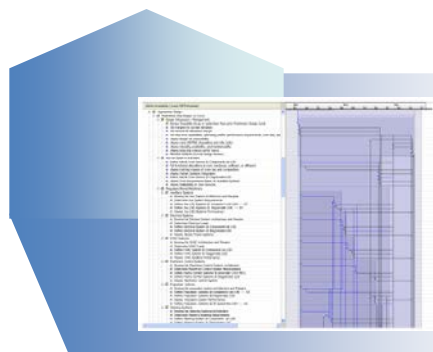# Process Data

SDPRM Business Processes

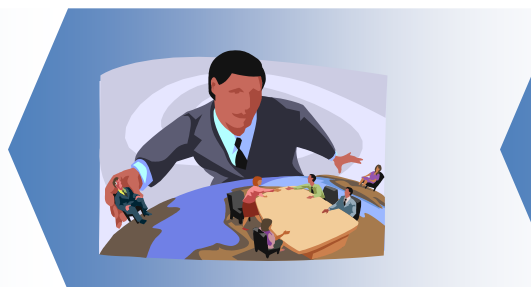1. SDM consults process model library to begin planning process.

2. Process visualization, rapid assessment of alternatives, and optimization.
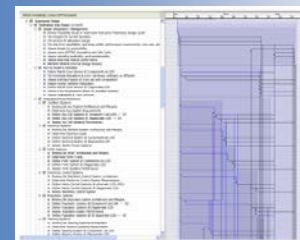
3. Data captured regarding team commitments and dependencies.
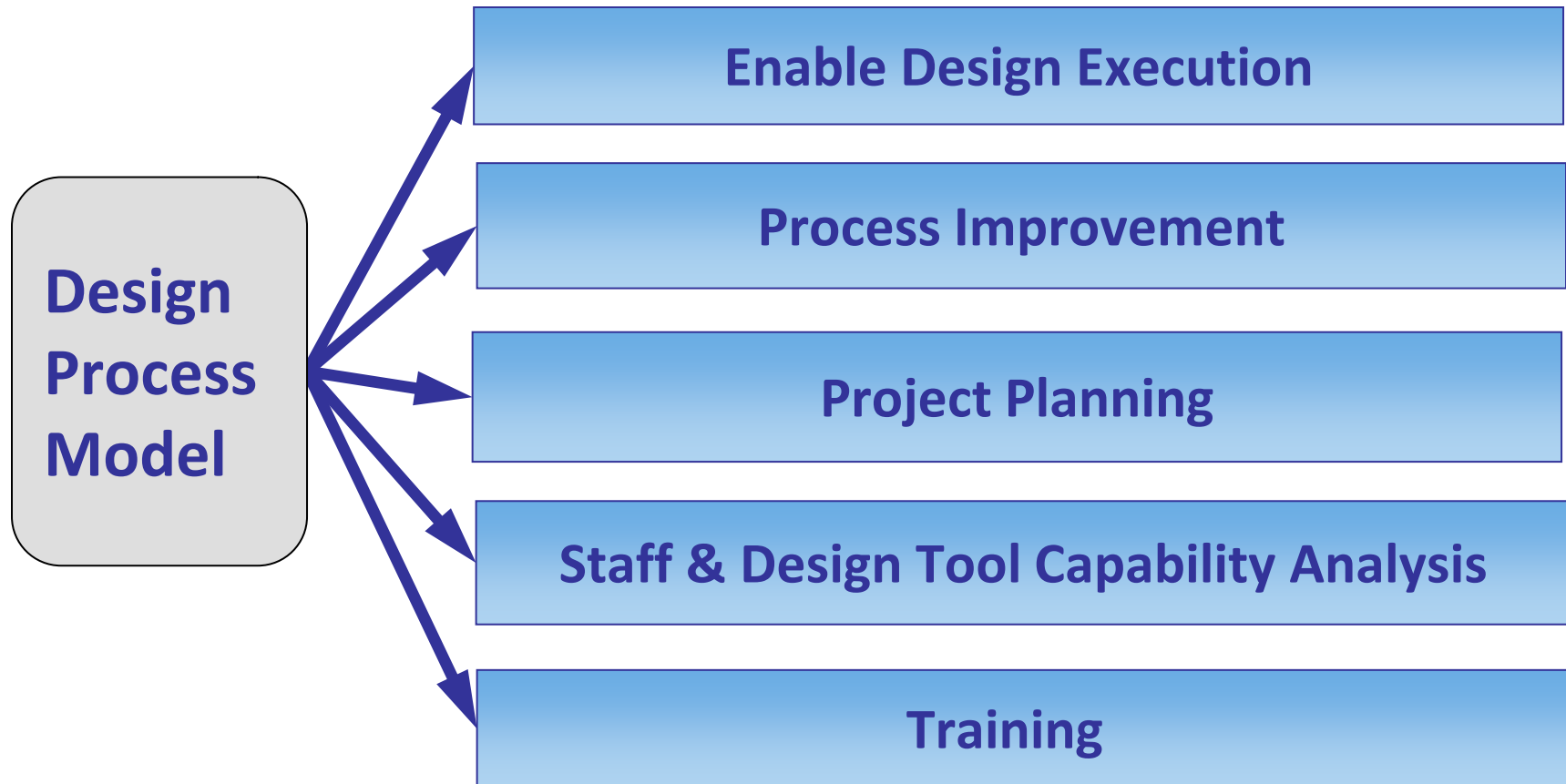
6. Actual results imported back in to the model.

5. Program management
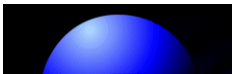
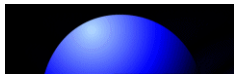4. Preferred process exported to MS Project.

SDPRM Applications

Design Process Model

- **Enable Design Execution**
- **Process Improvement**
- **Project Planning**
- **Staff & Design Tool Capability Analysis**
- **Training**

Summary

1. The ship acquisition community spends $Billions per year on engineering and planning processes.
2. Contemporary modeling tools and techniques are available to understand and assess processes.
3. Effective process execution requires the processes to be defined.
4. Process improvement requires well defined processes.
5. Process modeling supports training.

The SDPRM enables more effective ship design management - *leading to a more cost effective Fleet.*

Need more info?

- NSWCCD Process Model website:
  - http://www.navasea.navy.mil/nswc/carderock/pub/who/departments/ship_design/aspx

- 11th &13th DSM Conferences
  - http://www.dsmweb.org
  - http://129.187.108.94/dsmweb/en/dsm-community/dsm-conference.html

- Vendor data:
  - http://www.plexusplanning.com/